

REMARKS

Favorable reconsideration and allowance of this application are requested.

As an initial "housekeeping" matter, and in the interest of maintaining the integrity of the official record, applicants' records show that claims 21-41 are presently pending in this application. The notation of claims 21-40 pending in the subject application in the Office Action Summary therefore appears to be a typographical error as claim 41 attracted an art-based rejection (see page 4, line 14-17 of the official action). Correction of the record, as needed, is therefore requested.

By way of the amendment instructions above, claims 21 and 35 have been revised so as to include the subject matter of prior claim 26 and 36, respectively, and thus such latter claims have been cancelled as redundant. Each of claims 21, 35 and 39 has also been revised so as to clarify that there is no between step washing as supported at page 8, lines 4-6 of the originally filed specification. The dependencies of many remaining pending claims has been changed so as to be consistent with the amendments made to independent claims 21 and 35.

Accordingly claims 21-25, 27-35 and 37-41 remain pending herein for which favorable reconsideration on the merits is solicited. As will become evident from the discussion which follows, all claims now pending herein are in condition for allowance.

The Examiner asserts that WO91/05909 (Tables 1-3) teaches using sequences which include a second chlorine stage. However, Tables 1-3 relate to the sequence (CD) E DED in which the whole sequence is (CD)-wash- E- wash – D- wash- E-wash-D. This sequence is explained also in the handbook "Pulp Bleaching. Principles and Practice", page 17, left column.

In direct contrast, amended claims 21 and 35 as defined above relate to a so-called DAD stage. Applicants specifically note that the presently claimed DAD stage is not known or obvious from WO 91/05909, because there is a DD stage *without any*

intermediate acid step. The total chlorine dioxide dosage is added in two portions. The first portion is added to pulp so that the end pH of the first step of the pulp is 6-12, and after that the remaining ClO₂ portion is added and the end pH is 1.9-4.2. The pH is not adjusted between the chlorine dioxide additions. No acid is added to the pulp. Such a sequence is disclosed in claims 23 and 24 of WO 91/05909.

On the other hand WO 91/05909 relates in one embodiment (see page 8, line 23-page 9, line 15) to a two-step chlorine dioxide bleaching process, comprising the steps of:

- adding chlorine dioxide to a wood pulp suspension and subjecting the pulp suspension to a first treatment step for about 5 to 40 minutes so that the pH is between 6.0 and 7.5; and
- acidifying the suspension and subjecting the mixture to a second treatment step for about 2 or more hours so that the pH at the end of the second step is between 1.9 and 4.2.

In other words, WO 91/05909 reveals a D stage, in which the pH is first maintained at a high level for a short time and then at a conventional value (3,8) for a conventional time (3h). However, WO 91/05909 does not disclose a process in which chlorine dioxide is charged in **two portions** so that there is a long acid treatment step in between.

WO98/11295 (US 6123809) teaches that there may be an oxidizing stage (D) before an acid stage. However, no details on the oxidizing stage have been given. Clearly, WO98/11295 does not suggest at all that there would or could be a second D step according to the applicants' presently claimed invention.

Bhattacharjee teaches that a sequence DEDED is replaced with a sequence DZDED or DZDZD. By using ozone (Z), the consumption of chlorine dioxide is reduced. Lachapelle uses hydrogen peroxide in order to reduce bleaching costs in a sequence D(EOP)D(EP)D. Even though the two references reveal that a chlorination stage can

be replaced with a D stage, they do not teach or suggest any details of the applicant's claimed invention – e.g., a DAD sequence without between step washing.

The Examiner refers to WO 96/12063 and asserts that the acid treatment therein can be carried out before, during or after bleaching. Further he claims that it would be obvious to place the acid stage after the first D stage and before the second D stage in a DEDED sequence. It should be noted, however, that in the sequence DEDED, there is an E stage between the D stages. There is, however, no E stage between steps (a) – (c). Therefore, to clarify the herein claimed subject matter, the applicants have amended the claims to specify the absence of between step washing.

Vuorinen teaches (page 44, Abstract, first paragraph) that, because of its ene functionality, hexenuronic acid groups (HexA) react with several bleaching chemicals, such as chlorine dioxide. (HexA does not react with the ene functionality with hexenuronic acid groups, as stated in the Action, page 4). Vuorinen teaches that the reaction between HexA and ClO₂ can be prevented by removing HexA from pulp through an acid treatment. In claims 22 and 35 such an acid treatment is carried out after a D step. What applicants claim here is that step (a) is carried out so that HexA and ClO₂ do not substantially react and HexA is removed in step (b). Thus, in claims 22 and 35 it is done against the teachings of Vuorinen, because the acid treatment takes place **after** a D step.

Applicants note that Hinstead et al do **not** teach a chlorine dioxide step according to the present invention. The two minute reaction time disclosed in Hinstead et al is for a (CD) stage as made clear by the entire Hinstead et al disclosure, including the bold statement immediately after the title on Page 41 thereof.¹ Reference to the (CD) stage is the "chlorination stage" in the left-hand columns of Table 1 on page 42 of Hinstead et al, the stage E being the extraction stage in the middle columns of Table 1, and the

¹ "In a well-equipped mill, a (CD) E (HD) sequence can give high brightness."

(HD) stage being the "hypochloride stge" in the right-hand columns of Table 1 of Hinstead et al.

Carles et al also is irrelevant to the claimed invention. Carles et al relate to a process for bleaching an oxygen or peroxide pre-oxidized paper pulp using a hot chlorination step with gaseous chlorine, an alkaline extraction step in the presence of an oxidizing agent of the hypochloride type, and then a chlorine dioxide step at a temperature of between about 60-90°C with a pH of between about 5 and 11 (see column 7, lines 54 through column 8, line 23 of Carles et al). The conditions in Carles et al must be evaluated with the entire Carles et al sequence in mind, and one cannot select from Carles et al an arbitrary feature or one procedure therein without consideration of what Carles et al teach in its entirety to one of ordinary skill in the art.

Therefore, in view of the above, applicants suggest that the presently claimed invention is both novel and unobvious over all of the applied references of record. Early receipt of the Official Allowance Notice is therefore solicited.

Respectfully submitted,

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